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(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Stopper Device for a Recipient, Process for
Manufacturing Same and Recipient Fitted with Such a
Device

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Notice: This application is as filed and may therefore contain an
incomplete specification.



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ABSTRACT OF THE DISCLOSURE

The invention relates to the stopping of recipients with a neck by a capsule comprising a tapped stopper extended in its lower part by a guarantee strip internally presenting an annular bead and which is joined to the stopper by a zone of connection with low mechanical resistance, wherein the upper face of said inner bead is substantially perpendicular to the axis of the capsule and, whilst this upper face is joined by a marked angle to a starting face, the lower face of the bead joins a pre-centering slope. The capsule is demoulded by application of a torque causing the inner bead to pivot outwardly.

The capsule, made of plastics material, may be used on bottles of water.

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STOPPER DEVICE FOR A RECIPIENT, PROCESS FOR
MANUFACTURING SAME AND RECIPIENT FITTED WITH
SUCH A DEVICE

FIELD OF THE INVENTION

The present invention relates to a stopper device for recipient comprising a tapped stopper connected to or extended in its lower part by a guarantee strip joined to the stopper by a breakable zone of connection, i.e. with low mechanical resistance, this guarantee strip internally presenting an annular projection or bead.

BACKGROUND OF THE INVENTION

In practice, this type of stopper device, or capsule, often made of moulded plastics material, is adapted so that its tapping may be screwed on the threaded neck of a recipient, so that, when the device is placed in position, its security ring or guarantee strip is locked beneath a flange projecting on the outside of the neck of the recipient, below its threading.

The respective parts forming stopper and ring being joined by the breakable zone mentioned above, which extends normally substantially regularly around the device and therefore the neck of the recipient once the stopper device has been positioned, the user, when unscrewing the stopper for the first time, breaks or tears this breakable zone by twisting, traction and shear, thus making this first opening obvious.

However, in practice, the locking, before first opening, of the guarantee strip beneath the flange of the recipient is often fairly relative taking into account the usual shape given to the inner projection of the strip, experience showing that virtually only those projections forming a small inner bead are relatively easy to demould, but such beads do not perform their role fully once in place on the recipient.

It is an object of the invention to overcome these shortcomings by proposing a stopper device which may be reliably moulded then positioned with a well guided engagement of the hold bead of the strip, without risk

of tearing the breakable zone of connection, this bead, once locked, remaining effectively below the flange of the recipient at least until first opening, thus largely limiting the present risks of fraudulent opening.

5 SUMMARY OF THE INVENTION

To that end, a first characteristic of the invention provides that the upper face, close to the stopper, of said annular projection, or bead, of the guarantee strip extends substantially perpendicularly to the axis of
10 the device. It will be readily understood that, in particular, if this feature is combined with a thickness of bead such that the latter is virtually tangential to the outer diameter of the neck of the recipient beneath its holding flange, the present conditions of inviolability
15 of the recipients will effectively be improved.

Likewise to that end, a complementary characteristic of the invention provides that said upper face of this inner annular locking bead is joined, in the direction of the stopper, by a marked angle, close to a right-angle,
20 to a starting face of said bead presenting an acute angle with respect to the axis of the device, this clear change in inclination making it possible optimally to follow the present shapes of the flange of the recipients.

In order to facilitate initial engagement of the
25 guarantee strip beneath this flange, another feature of the invention provides that, inside the guarantee strip, the lower face of said inner bead will advantageously present an acute angle with respect to the axis of the device and will join, in the direction of the free
30 lower edge of this strip, a pre-centering slope forming, with the axis of the device, an acute angle different from that of said lower face of the bead. In particular, this connecting slope may present an inclination comparable to that of the lateral wall of the flange of the recipient.

35 In addition, the guarantee strip of the capsule

of the invention will advantageously comprise an annular zone of controlled deformations delimited in the lower part by said inner holding projection and, in the upper part, by an outer annular bead presenting in the upper
5 part, facing the base of the stopper, a bearing wall making, with the axis of the capsule, an acute angle open towards the strip, preferably included between 45° and 90°, thus promoting the positioning of the guarantee strip around the neck of the recipient with a controlled
10 deformation, without risk for the breakable zone.

Apart from the stopper device as such, the invention also relates to an assembly comprising the said device and the recipient itself.

As moulding of the plastic capsules usually involves
15 production difficulties, particularly during demoulding, the invention further proposes a solution to these problems within the scope of an improved process of injection moulding by means of a mould presenting a cavity reproducing the hollow recess of the capsule of the invention.

20 According to this process, after having moulded in one piece the capsule in question with its stopper and its guarantee strip, the following operations are carried out during demoulding:

- removing from the outer wall opposite the guarantee
25 strip, a first outer piece of the mould extending from a lower level at the free lower edge of said strip up to an intermediate level between those of the inner and outer projections of this same strip,

- exerting a torque on the strip tending to pivot
30 its inner annular holding bead outwardly thanks to a second piece of the mould then applied against the outer wall of the guarantee strip located between said upper level of the first piece of this mould and a zone located above the base of the stopper and said breakable zone,

35 - removing said second piece of the mould from the

outer wall opposite the capsule transversely to the axis thereof,

- and terminating demoulding by a final ejection, by the interior of the capsule, in a movement of displacement substantially parallel to its axis.

In this way, it will be possible easily to demould the very marked inner annular bead, quite independently of the manner in which the breakable zone will be effected, i.e. the latter is produced at the moment of moulding of the device, or after demoulding.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more readily understood on reading the following description with reference to the accompanying drawings, in which:

Figure 1 shows a front view, half in section, half in outside view, of a capsule or stopper device according to the invention, comprising the stopper and its guarantee strip moulded in one piece, as the capsule is when it is ready to be mounted on a bottle.

Figure 2 shows the capsule of Figure 1 after having been positioned on the neck of the recipient that it is to stop, the guarantee strip in that case being locked beneath the flange of the bottle.

Figure 3 shows in detail, on a larger scale, the part marked III in Figure 1.

Figure 4 schematically shows the mould and its process of implementation allowing one-piece manufacture of the capsule.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings, the capsule of the invention, made of plastics material (for example polyethylene), is generally designated by reference 1 and comprises the stopper 2 and the guarantee ring or strip 3. The stopper and strip are joined by joining bridges 4 separated by peripheral slots 5. The bridges 4 are

substantially regularly distributed over the whole periphery of the capsule in a plane substantially perpendicular to the general axis 1a thereof. These bridges 4 conventionally constitute a breakable zone of connection of low
5 mechanical resistance, and which, before the capsule is first opened, joins together the base or lower part 6 of the stopper and the upper part of the guarantee strip 3.

Underneath, this guarantee strip firstly comprises,
10 on its outer wall, a first annular projection or outer peripheral bead 7 which, seen from the top of the strip to the bottom (i.e. moving away from the stopper 2), firstly presents an inclination 8 making an acute angle α downwardly open with respect to the axis 1a of the
15 capsule, then returns inwardly at the location of a face 9 transverse to this axis. The inclination 8 will generally be given an angle such that $15^\circ \leq \alpha \leq 90^\circ$. However, an angle $45^\circ \leq \alpha \leq 90^\circ$ is recommended, so that, during first engagement of the "untouched" capsule on its recei-
20 ving bottle, the strip 3, on passage of the flange of the bottle, comes into abutment by this inclination 8 beneath the base of the stopper, by forced outward deformation of the strip, relieving the bridges 4 accordingly.

On the contrary, the inner wall of the strip firstly
25 presents an inclination substantially parallel to axis 1a, which inclination changes direction substantially from the level of face 9, to an inclination 12 forming an acute angle β open upwardly with respect to axis 1a to start a second peripheral bead or inner annular
30 projection 13 that the strip therefore presents at a level lower than that of the outer projection 7. In practice, angle β will be such that $0^\circ \leq \beta \leq 45^\circ$.

It will be noted, particularly in Figures 2 and 3, that, according to the invention, the upper face 13a
35 (closest to the stopper) of the inner bead 13 is perpendicu-

lar or virtually perpendicular to the axis 1a, so as to define a clear holding bead, this face 13a furthermore joining the "starting" inclination 12 by a marked angle 14 close to a right angle (but not attaining it, essentially due to the production of the piece from moulded plastics material).

Underneath, the inner bead 13 continues in an inclination 13b making an acute angle γ ($20^\circ \leq \gamma \leq 60^\circ$), open downwardly, with respect to axis 1a, this inclination itself joining, in its lower part, a slope 15 of different inclination with an angle δ ($0^\circ \leq \delta \leq 20^\circ$) more closed than the first, so that, from its lower opening at the base, the capsule, and more precisely the strip 3, presents a double frustum of cone 15/13b with double inclination joined to one another by a marked angle 16, the frustum of cone 15 itself terminating, at the free lower end 3a of the strip, in a rounded part 17 for connection to the outer wall. Heights h1, h2 projected parallel to axis 1a of the two inclinations 13b and 15 respectively will advantageously be substantially equal, considering the inclination 15 as stopping at the beginning of the rounded part 17.

Figures 2 and 3 further show the relative fineness of the band of material 18 which obliquely joins the two outer (7) and inner (13) beads and whose shape and thickness are precisely adapted to ensure optimum manufacture of the strip, promoting in particular the demoulding operations, whilst allowing this strip to be deformed in controlled manner during engagement thereof on the recipient.

To position this capsule 1 on the bottle or recipient 19 shown in Figure 2, it suffices to apply the capsule by force, in the direction of arrow F, on the neck 20 of this bottle, whilst screwing it. The internally tapped stopper 2 is thus positioned on the thread of the bottle,

shown at 21. Guided and centred by its double slope of engagement 13b/15, the strip 3 firstly slides, moving away on passage over the projecting flange 22 of the bottle, until it is elastically locked under this flange via its bead 13 which, in practice, will then internally preferably be substantially tangential to the outer wall 23 of reduced diameter of the neck 20. In other words, bead 13 advantageously presents an inner diameter substantially equal to the outer diameter of this neck at the location of wall 23.

When the bottle is first opened, it suffices to unscrew the stopper 2, which causes it to move in the direction of arrow Q of Figure 2, thus causing rupture of the joining bridges 4 by shear and tear, said bridges then being able to break in their upper part where they join the stopper, taking into account the general process for manufacturing the capsule which may ensure a smaller section therefor on the stopper side.

In Figure 4, it is seen that manufacture of such a capsule by moulding is particularly simple, employing only one mould comprising a limited number of pieces, with two movements of displacement, in the direction of axis 1a of the capsule and transversely to this axis (arrows F5).

More precisely, the mould comprises an outer impression 24 for the outer part of the stopper 2 up to the small shoulder 25 which the stopper presents at the base of its fine outer ribbings 26. Beneath the impression 24 is disposed a block 27 for moulding the outer shape of the base 6 of the stopper and of the strip 3 up to substantially midway along its joining band 18 (cf. Figures 2 and 3). Still on the outside, beneath block 27 extends another block 29 for moulding the outer wall of the lower part of the strip. Inside, a piston or inner broach 30 ensures moulding of the inner part of the upper transverse

wall 2a closing the stopper, as well as the whole lateral inner impression of the capsule, from the top of the stopper to the base of the strip, a central ejector 31 completing the assembly and ensuring in particular internal
5 moulding of the central part of the wall 2a.

The piece being moulded in the position illustrated in the left-hand part of Figure 4, all pieces of the mould being closed, the capsule is demoulded by effecting the following successive operations:

- 10 - opening of the mould by withdrawal of impression 24 parallel to axis 1a, in the direction of arrow F1,
 - relative withdrawal of the block 29, in opposite direction, still parallel to axis 1a, in the direction of arrow F2, thus releasing to the outside the zone located
15 opposite the lower part of the strip 3,
 - withdrawal of the piston 30 in the direction of arrow F3, at the same time as the central ejector 31 is pushed upwardly in the direction of arrow F4, the capsule being accompanied in this axial movement via
20 the intermediate block 27, and this over a sufficient length to exert on the strip 3 a torque centred at the level of its connecting band 18, thus ensuring articulation with rotation towards the outside of the whole part of the strip located below this zone 18, and therefore demoul-
25 ding of the inner bead 13,
 - as soon as this part of the strip is sufficiently withdrawn towards the outside (arrow f), one proceeds with a lateral spacing apart substantially perpendicularly to the axis 1a of the block 27, in the direction of arrows
30 F5,
 - finally, ejection terminates by continuing the axial displacement of the ejector 31 in the direction of arrow F4, the strip 3 progressively resuming its shape (arrow f').

35 It will be noted that the capsule 1 may possibly

be moulded so as to present in its lower part, and in particular from the base of its strip 18 up to near its free lower edge, narrow outer ribs 32 (cf. Figures 1 and 2) extending over the whole periphery of the strip, preferably substantially parallel to axis 1a, these rigidifying ribs 32 possibly being completed by one or more annular ribs 33 (cf. Figure 1) intersecting ribs 32.

Concerning the production of the bridges 4, or any other form of the breakable zone of connection between the stopper and the strip, it will be noted that, taking into account the presence, on the mould, of the block 27 with essentially transverse displacement, the often critical question of the possible excess fragilization of this zone at the moment of demoulding does not exist in the invention, as the technique of manufacture imagined herein is not particularly interested by this question. Moreover, it is quite possible to envisage shaping this zone (and therefore in particular the bridge 4) only after total demoulding of the capsule, during an operation on a cutting machine with cutters for the openings 5 and provided with notches for the bridges. If it is nonetheless preferred to make these bridges during moulding, it will be further noted that, in practice, any shape in relief or undercut (particularly as in Figure 3) may be given thereto.

Different variant embodiments may, of course, be envisaged. In particular, it may be provided that, after rupture of the bridges 4, the strip 3 does not remain on the recipient, but leaves with the stopper.

To that end, it may be provided to add to the bridges a more solid tie joining the stopper and the guarantee strip, this additional bridge of material being laterally completed, on either side, by two incipient cracks, one or other of which would cause the strip to break and thus freely pass the obstacle of the flange of the recipient.

WHAT IS CLAIMED IS:

1. Stopper device for a recipient, comprising a tapped stopper extended in its lower part by a guarantee strip joined to the stopper by a zone of connection with low mechanical resistance, said strip presenting an inner annular projection or bead,
5 wherein the upper face, close to the stopper, of the inner annular bead is perpendicular or substantially perpendicular to the axis of the device.
2. The stopper device of Claim 1, wherein said upper
10 face of the inner annular bead of the guarantee strip is connected, in the direction of the stopper, by a marked angle, close to a right angle, to a face starting said annular bead presenting an acute angle with respect to the axis of the device.
- 15 3. The device of Claim 2, wherein said face starting the inner bead makes an angle included between about 0° and 45° with respect to the axis of the device.
4. The device of Claim 1, wherein, inside the guarantee strip, the lower face of said inner bead remote from
20 the stopper presents an acute angle with respect to the axis of the device and is joined, in the direction of the free lower edge of the strip, to a pre-centering slope making with the axis of the device an acute angle δ different from that of said lower face of the bead.
- 25 5. The device of Claim 4, wherein the angle of said pre-centering slope is such that $0^\circ \leq \delta \leq 20^\circ$.
6. The device of Claim 4, wherein the heights in their rectilinear part, parallel to the axis of the device,

of the pre-centering slope and of said lower face of the inner bead are substantially equal.

7. The device of Claim 1, wherein the guarantee strip presents on its outside another annular projection disposed
5 at an intermediate level between said inner bead and said zone of connection with low mechanical resistance, this outer annular projection presenting an upper face close to the stopper making an acute angle with respect to the axis of the device, included between about 45°
10 and 90°.

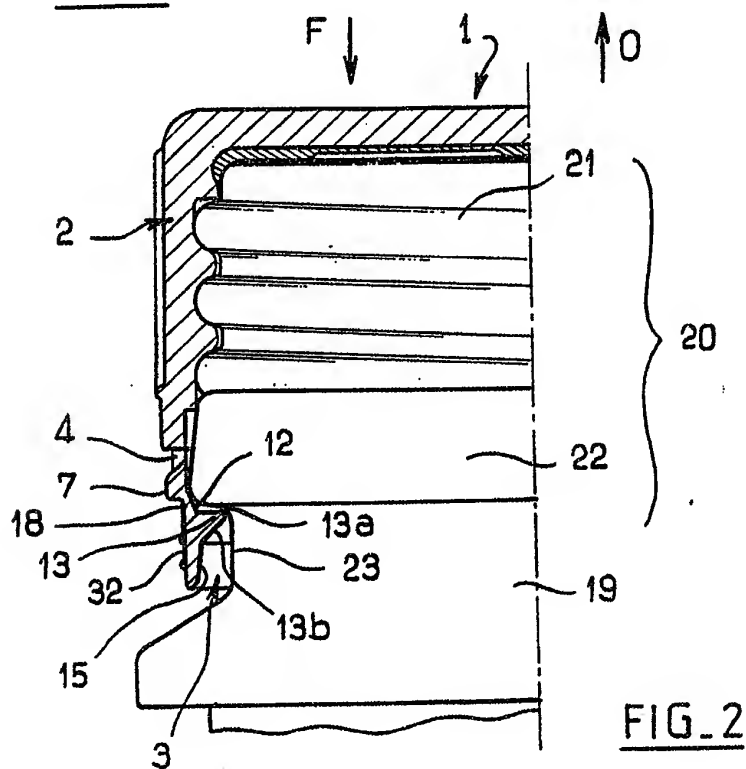
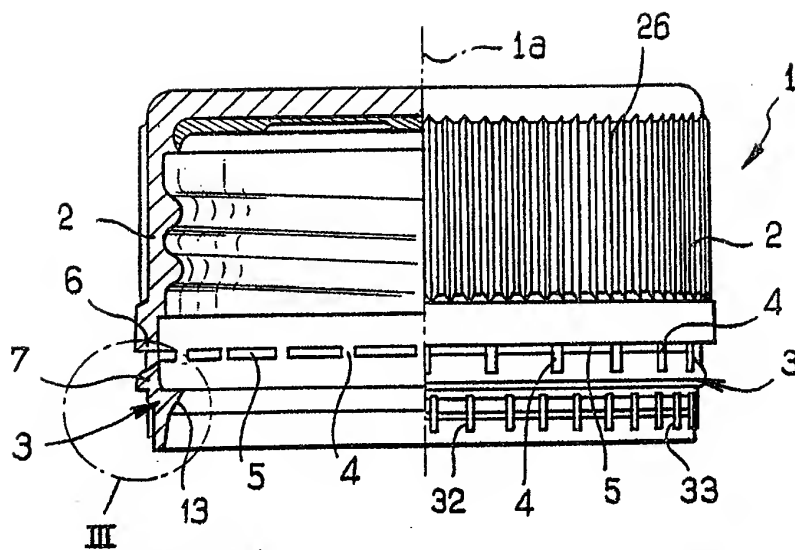
8. The device of Claim 7, wherein, on the outside, below said outer annular projection, the guarantee strip presents narrow reinforcing ribs extending substantially parallel to the axis of the device.

15 9. The device of Claim 1, wherein said zone of connection with low mechanical resistance is constituted by bridges substantially regularly distributed around the device, being separated from one bridge to the following by openings, the section of these bridges being greater on
20 the strip side than on the stopper side, so that, when the device is opened for the first time, the bridges remain fast with the guarantee strip.

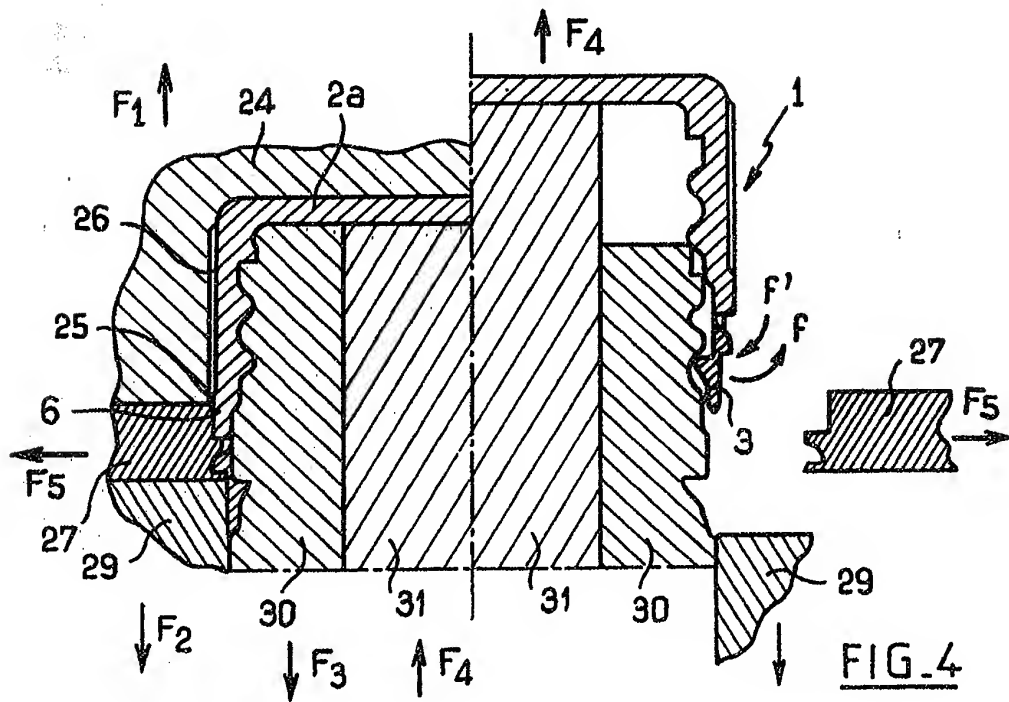
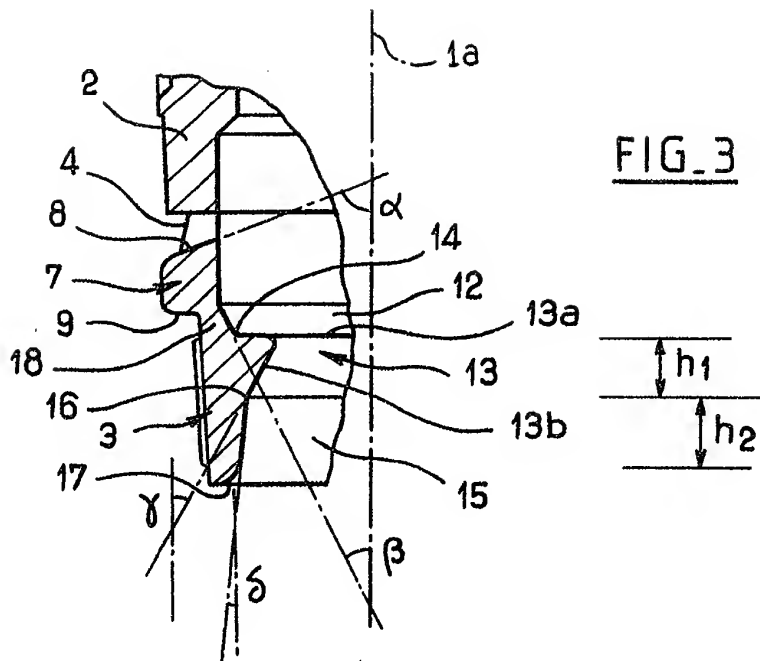
10. Process for manufacturing by injection moulding a stopper device for recipient of supposedly vertical
25 axis, by means of a mould presenting a cavity reproducing the hollow impression of said device, which comprises a tapped stopper connected, in its lower part, to a guarantee strip joined to the stopper by a breakable zone of connection, this strip comprising an annular deformation
30 part delimited in its lower part by an inner annular bead whose upper face is substantially perpendicular

to the axis of the device and, in its upper part, by an outer annular projection, in which process, after the device has been moulded in one piece, the following operations are carried out:

- 5 - removing from the outer wall opposite the guarantee strip, a first outer piece of the mould extending from a lower level at the free lower edge of said strip up to an intermediate level between those of said inner and outer projections of said strip,
 - 10 - exerting a torque at the location of said annular deformation part of the strip, to pivot said inner bead outwardly by means of a second piece of the mould then applied against the outer wall of the guarantee strip located between said upper level of said first piece
 - 15 of this mould and a zone located above the base of the stopper,
 - removing said second piece of the mould from the outer wall opposite the device and transversely to the axis thereof,
 - 20 - and terminating by a final ejection, by the interior of the stopper device, in a movement of displacement substantially parallel to its axis.
11. Assembly comprising a recipient with threaded neck and, therebeneath, an outwardly projecting flange beneath
- 25 which is locked, when the recipient is delivered, said guarantee strip of the stopper device of Claim 1.



Sum. 2 of 2



Sketch by M. L. Bunnell